Agriculture *for* Development

Tropical Agriculture Association

Boxes, Tea and Lovegrass

Human Race Prosperity

Pakistan Flood of 2010—the Consequences

Food Crisis Continues

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Contents

Cover Photograph: Tea Garden in Munnar, Kerala, India (Keith Virgo)

The TAA is a professional association of individuals and corporate bodies concerned with the role of agriculture for development throughout the world. TAA brings together individuals and organisations from both developed and less-developed countries to enable them to contribute to international policies and actions aimed at reducing poverty and improving livelihoods. Its mission is to encourage the efficient and sustainable use of local resources and technologies, to arrest and reverse the degradation of the natural resources base on which agriculture depends and, by raising the productivity of both agriculture and related enterprises, to increase family incomes and commercial investment in the rural sector. Particular emphasis is given to rural areas in the tropics and subtropics and to countries with less-developed economies in temperate areas. TAA recognizes the interrelated roles of farmers and other stakeholders living in rural areas, scientists (agriculturists, economists, sociologists, etc.), government and the private sector in achieving a convergent approach to rural development. This includes recognition of the importance of the role of women, the effect of AIDS and other social and cultural issues on the rural economy and livelihoods.

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Water: the life-blood of humanity

We all know that we can live without electricity to light our darkness at night, to cook our food, to warm us or cool us with airconditioning, but the one commodity that is essential for life is water. Life is not sustainable without it. Man cannot exist without it. Those of us who have worked in desert areas, or lived in urban areas when the water supply has been cut off by natural disasters, know how important even a drop of water is to existence.

Unfortunately Mother Nature is not able to control, at any one time, the quantity of water delivered to people throughout the world, so it can be too little or too much. The devastating effect of the floods in Pakistan last year is highlighted in John Hansell's paper, detailing not only the tragic loss in human lives and property but also the unprecedented loss of crops and animals suffered by the farmers. The great majority of Pakistan's rural community depend on agriculture for their livelihood so it is going to be quite some time before they can regain the stability they had before the floods.

Elsewhere, farmers have to develop agronomic practices to counteract erosion or to maintain soil moisture and structure as illustrated by Francis Shaxson in the research done on tea in Malawi nearly fifty years ago. Today, farmers in Africa are still using these types of methods to help improve crop productivity. Managing water supply, whether it be to maintain wetlands or ensure groundwater storage capacity, is essential for the wellbeing of rural communities.

Water is vitally important to plant life. Food production is of paramount importance to sustain the world's growing population. Looking back, it is surprising that the worldwide agricultural community, especially the Consultative Group on International Agricultural Research, was blinkered and did not dedicate an individual organisation to water until the International Water Management Institute was founded in Sri Lanka in 1985. Water use in agriculture was on the agenda of many research organisations, but investigated specifically within the organisations' protocol. IWMI is now active in 12 countries in Africa and Asia working on water productivity and poverty and assessing the impact of interventions to improve water access for farmers while sustaining the natural resource base. Such work should have been started a long time ago.

Editor required

ExCo urgently seeks a new editor for Agriculture for Development and would be pleased to hear from any member who would like take over the job of producing the quarterly publication. The main responsibility is one of management; sourcing articles and other materials for publication, editing, and putting together all material in edited form for the desktop publisher. Jim Waller, who edits a considerable quantity of the scientific reporting, will be available for another year.

The position also carries responsibility for the Publications and Communications Committee and supervision of the TAA website until a new webmaster is appointed.

Any member interested in joining ExCo and editing Agriculture for Development should contact the General Secretary, Elizabeth Warham, at general_secretary @taa.org.uk.

(This article in based on data from Tea Research Station records in the 1960s: Annual Reports 1962-3 to 1969-70; Quarterly Newsletter 34, 1964, and some field notes)

Boxes, Tea and Lovegrass

Conservation-effective practices on tea estates in Malawi

T.F. Shaxson

Francis Shaxson joined the Nyasaland (became independent Malawi in 1964) Department of Agriculture as a Soil Conservation Officer in 1959 and from 1962-69 was Agronomist on the staff of the Tea Research stations based in Mlanje. francisshaxson@btinternet.com

Introduction

The main tea-growing areas in Malawi are in limited parts of Mulanje and Cholo (Thyolo) Districts where the characteristics of soils and rainfall together are sufficient for growing this perennial crop. In the increasingly hot weather of November/December the clouds build up and the rains start generally in late November, diminishing though March and effectively ending in April, leaving about 7 months of cooler, then warming, virtually rainless weather. Such a sequence provides relatively harsh conditions to be survived by both mature tea – especially if planted on soils of limited depth – and especially by young plants with small but growing root systems during the first 3-4 years after planting.

The old saying "There's no erosion under mature tea" may well be true, but the time taken to get to that stage used to be unnecessarily inefficient in terms of (a) wastage of water via runoff of incident rainfall, and (b) erosion of soil from the clean-weeded soil surfaces between the widely-spaced plants (which fifty years ago was commonly 4ft. by 4 ft.). Before the roots had got far enough down into the soil, in hot dry weather of their first, second and even third year of life in the field, the young plants suffered stress from both drought in the soil induced by evaporation of critical moisture from the upper layer of soil, and from heat stress due to high temperatures and reflected insolation from the soil surface.. When the rains came again, runoff meant that moisture reserves in the soil were not as deeply and rapidly replenished as desired, and that root growth was not as profuse as it could have been.

"Because a marked seasonal rainfall pattern over the tea area of Nyasaland (now Malawi) limits cropping potential, it is considered necessary to take measures to ensure maximum retention and infiltration of rainfall on tea lands, thus minimizing water and soil loss by runoff." (AR 1962/63, p.24).

Countering runoff

For the problems of runoff and erosion, the conventional approach on the estates was to build earth bunds along the strict contour at regular intervals downslope of the flat-planted field, among the square layout of young tea plants. It was clear that this was not very effective, because the bunds had insufficient catching-capacity on their upslope side to hold back all the runoff, and would break and release the pent-up water in concentrated flows which carried with it eroded soil materials.

In the 1960s, at the Tea Research Stations in the two districts, we investigated different aspects of how such problems could be minimized or even avoided. Initially we were working on the common assumption that erosion was the primary cause of the problem, leaving behind a damaged soil that could not absorb water fast enough. Our first trial was to make earth 'boxes' around the individual young plants in their square-

planted configuration, with the idea of detaining water in many but much smaller 'ponds' bounded by walls about 5-6 inches high, and thereby of also halting erosion. The first rainy season (1961/62) was enough to show that such as system could be effective only as long as none of the boxes overflowed, which in fact did happen in the 9 high-intensity downpours that occurred among 34 rainfall events in that season. Failure of even one box causes an increasing cascade down through all the boxes below. However, from a field of young tea that had been planted in 'boxed' furrows aligned parallel to the contour, the runoff measured at the outlet was reduced, but again, only as long as the furrow-walls themselves did not breach and allow flow straight down the slope.

Another problem associated with clean-weeded soil, which is exposed to high-intensity raindrops, is that of significant breakdown of soil structure at the surface, the splashing of dislodged soil particles, plus the ramming-down and effective sealing of the surface. Even a 1/10th inch of crust is sufficient to provoke significant runoff, thereby 'starving' the shallow roots of first-season plants of essential moisture. (You have to go out in heavy rainstorms to see this happening – it's all over by the time the rain has stopped falling!)

The bare surface of a well-structured soil damaged by intense rainfall: the underside and topside of a soil crust.

This effect adds to the stress induced earlier by hot dry conditions. Both heat and insufficiency of moisture hinder quickest and most profuse development of roots systems exploring the soil below. Delays to their deep and profuse development are also reflected in the plants' rates of survival, and subsequently by reduced development of the system of above-ground branches which, when pruned, provide the framework of the mature bush. Sub-optimal rates of downward growth of the roots hinders access to the rainwater which has managed to infiltrate down into the soil profile and be stored as soil moisture, and which is essential for survival of fully developed tea plants during the dry season. In deep soils explored by mature tea, gravimetric sampling and monitoring of soil moisture during the 1950s and 1960s had shown that in the dry season, mature tea transpires moisture into the atmosphere from the maximum depth sampled (17.5 feet) even after depleting the soil from Field Capacity (during the rains) to Wilting Point (at the end of the dry season) in the top 10 feet.

Effects of Mulch

Field plots

Starting in 1963, we tried mulching the soil surface with 1-2 inch depth of grass hay cut from Weeping Lovegrass (*Eragrostis curvula*), as a buffer against both intense rainfall impact and extremes of temperature. Two investigations ran in parallel:

In a multi-factor experiment at Mlanje the effects of mulch vs. no mulch were investigated on the survival and development of seedlings and 30-month stumps in their first three seasons in the field. Mulch significantly improved the rates of survival of both types of planting material by comparison with the un-mulched treatment, as indicated below:

Interaction between mulch and type of planting material reflected in percentage deaths, Mlanje, June 1963

Planting material	- mulch	+ mulch
6-mo. Seedlings '63	24.9	12.8
'64	36.2	19.8
30-mo. Stumps '63	9.2	5.8
'64	13.7	8.7

In the next seasons, the same trial furnished information on the benefits of mulch on survival after first pruning (at 6 months or 18 months.), showing very significant benefit to mulch.

Percentage deaths according to interactions between time of first prune and mulching treatment (averaged over the two planting materials), Mlanje, June 1964

Time of first prune	- mulch	+ mulch
6 months	29.9	10.0
18 months	19.1	11.2

After first pruning, plant vigour – indicated by the number of pruned branches per bush after pruning – had evidently been compromised by lack of mulch.

No. of pruned branches per bush, Mlanje, June 1963 and 1964.

Planting material	- mulch	+ mulch
June 1963, (av. of seedlings + stumps	8	10
June 1964		
Seedlings	71	95
Stumps	113	147

This was reflected in the yields in the first and second plucking seasons:

Yields in lbs. made tea per acre, according to mulching treatment, (uncorrected for no. of deaths)

Yield	- mulch	+ mulch
(av. of seedlings + stumps)		
1964/65	309	534
1965/66	735	1121

"The most important point illustrated by this experiment is the markedly beneficial effects of mulch on young plants. Basically the effect of mulch on the treated plots of this experiment has been to prevent rainfall panning the surface of the soil, and to prevent evaporation from the surface. Beneath the mulch the soil is in a very friable and stable condition, in marked contrast with the un-mulched plots. The infiltration capacity of the soil appears to have been maintained by the active incorporation [by soil biota] *of decomposed mulch material, with the build-up of relatively stable soil crumbs. In addition, the soil is kept cool and damp by the mulch, which prevents the rapid development of water stress in the surface layers, thereby permitting better plant growth".* (AR 63/64, p.11).

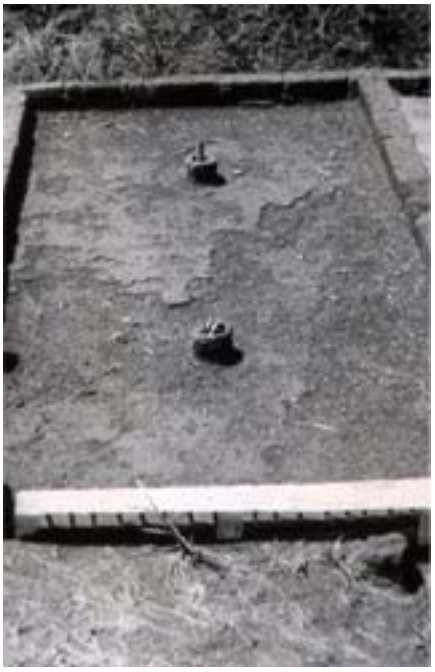
Another trial showed that putting water at the bottom of planting holes immediately before planting *"puts the maximum amount of water in the position where new roots will develop. Survival then apparently becomes dependent upon the plant becoming self-supporting before moisture stress arises…"* (AR 63/64, p.14-15).

Micro-plots

We looked at these effects in another trial, using monitored micro-plots to measure daily losses of water and soil, which was continued for six years, until full cover of the soil by the dense canopy of leaves and branches had been fully achieved.

Runoff and soil loss was measured daily (after every rainfall event) from five replications of two treatments – (without vs. with mulch), in two-bush un-'boxed' microplots across an 8% slope. Each micro-plot was separated from its neighbours by an equal-sized plot also mulched, as a 'buffer area', from which hand-weeding operations could be undertaken, when necessary, without walking on the plots themselves.

Mulched micro-plot with newly planted tea-stumps, their collars protected by short pottery rings, which had been found to favour the emergence and growth of young shoots (just visible). [In this and the next photo, 'Downslope' is from bottom left to top right]. Collectors of runoff from each recorded plot are drums located in the trench.



Crusted surface of un-mulched plot after 3 months' rainfall impact. The surface affected by both impact and soil loss.

The trial was set up, after uniformity-recording of the plots in Jan/Feb 1963, on 5th March 1963, when mulch was first applied to the relevant plots, (and maintained at a constant depth of 1.5 inches thereafter). The growth of the bushes, after normal pruning to form the shape, attained closure of the canopy after 3 years. Over the periods of the rains 1963/64 and 1964/65, 117 inches of rain were recorded, of which 20.6 inches equivalent was lost as runoff from the un-mulched plots and only 0.6 inches from the mulched plots. (In very intense single storms, up to 40% of the rain was lost as runoff from un-mulched plots). Data are shown below.

Period	Rainfall total (ins.)	Effective rainfall entering soil = rainfall – runoff (ins.)		Notes
		+ mulch	- mulch	
Jan.-Mar.4 1963	47.9	[33.4]	[33.4]	Period of Uniformity check of plots
(Mar.5'63-Jun.'63)	23.0	22.2	21.2	+mulch / -mulch applied No canopy of leaves
Dec.'63-Mar.'64	32.3	32.1	25.6	Canopy very sparse
Nov.'64-Jun.'65	61.8	61.5	49.6	Canopy increasing
Nov.'65-Jun.66	46.1	46.0	38.7	Canopy increasing
Nov.'66-Jun.'67	48.4	48.2	41.7	Canopy complete
Nov.'67-Jun.'68	46.0	45.9	41.6	Canopy complete
Nov.'68-Jun.'69	71.9	71.7	71.4	Canopy complete

Note: from March '63 to June '65, no soil was lost from mulched plots, but the equivalent of over 50 tons/acre was lost from un-mulched plots.

"Under mulched conditions, rainfall acceptance by the soil surface layers was maintained under all storm conditions, and the antecedent soil moisture conditions did not apparently affect the volume of runoff. Where mulch was not applied, both antecedent rainfall, current rainfall in excess of about 0.75 inch and current storm intensity characteristics had a marked effect on the amount of runoff, which [in individual storms] sometimes reached 20% and on occasions 40% of the total amount of rainfall". (AR 63/64 p.38)

Once the canopy had effectively closed, the plant leaves themselves broke the force of the potentially damaging large raindrops, and the surface was also covered with a layer of pruned shoots etc. automatically taking over the functions of the earlier grass mulch.

One end of the site, at full canopy, after the end of the trial, also showing the drums used to catch soil and water from each individual plot.

It is interesting that, even 4.5 years of recording, there were still slight differences in runoff detectable from the two treatments. Damage to the soil of the un-mulched treatment in the early years had effects that persist even after full canopy had been achieved. A note in the file stated: *"It was evident from records of intensity of rainfall that the most runoff occurred as a result of high-intensity storms. As a general rule, runoff from un-mulched plots occurred in storms when 0.75 inch of rain, or more, fell in 60 min. During the 1963/64 rains, after the mulch had been on the [relevant] plots for one and a half seasons, it was very noticeable that the surface soil structure was in excellent condition, permitting rapid infiltration of rainfall through the surface layers into the soil profile."*

Mulch and soil temperatures

Another set of records provided further relevant information about the buffering effects of mulch on temperatures in the soil surface layer, with and without mulch cover. This was provided by Chisunga Estate's records from measuring temperatures of the air, and of the soil – with and without mulch – at a depth of 1.5 inches, April 1965–Jan. 1966.

Field of tea planted to seedlings in Dec. 1964

Difference in temperature noon – 6am. (°F)									
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan
Air	-	-	14	12	13	14	13	12	9
- mulch	18	17	20	21	18	17	15	16	9
+ mulch	4	2	4	7	5	4	5	5	2
Min temp. 6am (°F)					Max. temp Noon (°F)				
Air			57					83	
- mulch			56					84	
+ mulch			58					75	

Generation of Recommendations for Tea Estates and the Smallholder Tea Authority

By the dry season 1967, on the basis of these accumulated findings, we formulated, and demonstrated in the field, an integrated approach to conservation-effective land husbandry practice, from field preparation through planting/replanting and maintenance. Its main components are:

- Identify the natural crests as possible routes for self-draining roadways, and natural drainage lines as routes for grass-protected watercourses.
- Align conservation bunds, at intervals down the slope of land, as before, but on at shallow ('controlled') gradients from crest to watercourse, ensuring roadside drainage into each bund-end, and out of the other end each bund into the protected watercourse.
- Plant a suitable grass (e.g. Weeping Lovegrass), along the bunds, which, when cut, can provide mulch for the plantings.
- Make furrows spaced at a constant distance (e.g. 2.5ft. apart), parallel to the contour, so they too run from crest to watercourse on a shallow gradient. Make boxes along the furrows.
- Plant at the recommended spacing along alternate furrows, and mulch between the plants.
- Avoid the spread of fire in the dry season by leaving the unplanted furrows without mulch, and leaving un-mulched stripes up and down the slope to prevent fire travelling all along the rows.

By this means, the benefits of contoured 'boxing' is linked with the benefits of mulch, to get the plants off to a good start and be underlain by high volumes of plant-available water in the soil beneath. This system can be mechanized if necessary.

Contour-boxed and mulched young tea. Note transverse walls are lower than the furrow walls, to faciltate cross-slope flow of any excess.

Two of the reasons given by estate managers for preferring this system were/are:

1. Survival and development rates of the young plants are better than previously, and
2. Because the roadways are self-draining to either side, they remain passable throughout the rainy season, when it is urgent that delivery of trailer-loads of the fresh plucked tea from the field to the factory continue uninterrupted in wet weather.

A number of practical training courses on these techniques were held for staff of estates and the STA on these means of making better use of rainfall.

Conservation-Effective Agriculture

These understandings and actions further the cause of better land husbandry and the sustainability of ecosystems and of the services they provide.

Andrew Hughes

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Modelling and management of a degraded wetland in south-west Uganda

Context

Wetlands in East Africa provide a number of important ecological services for both wildlife and local communities. However, in many areas it is felt that these systems could be better used for grazing or arable farming. Consequently, many have been drained and cultivated, a process that may be exacerbated by climate change. Wetland loss is widespread across much of Uganda and threatens ecosystems ranging from headwater flood-plains and sedge wetlands, to the vast downstream papyrus (*Cyperus papyrus*) swamps that fringe the major lakes and rivers of the Lake Victoria basin. The loss of ecosystem functions from wetlands can have detrimental effects for wetland-dependent wildlife and may hamper rural community development where freshwater resources are vital for agricultural water supply and raw materials. Groundwater is a further important resource for rural communities in Uganda and often has an intricate relationship with wetlands and their processes. Although wetlands are largely groundwater fed systems, they can also play a significant role in recharge to the groundwater store. Wetland removal may cause loss of hydrological storage capacity and vegetation and reduce groundwater recharge. The impact upon boreholes and wells from lower water tables will inevitably add to the existing concerns over water supply in rural Uganda.

Figure 1. Papyrus Swamp

Makondo Valley

The above issues are evident in the Makondo Valley, a small catchment in south-west Uganda. The valley wetland has recently experienced drying out periods, while residents claim a decline in water quality and quantity from boreholes and wells. The importance of maintaining water table levels should be recognised, particularly as projected population increases will require increased agricultural production. Therefore, it is necessary to assess the impact of land use changes on the water table in areas such as Makondo Valley. A greater understanding of the effect of different vegetation covers (and hence the changes in water requirements and evaporation from wetland vegetation) on water tables would generate information to inform future decisions on land and wetland management.

The Makondo Valley covers 16 km^2 in south-western Uganda, between 1200 and 1400 metres above mean sea level. It is part of a larger swamp drainage network to the Katonga River. The valley is dominated by freely draining lateritic sandy loams, with some silt loams present on the gentler slopes. The valley bottoms constitute grey sandy clays formed from papyrus residue and alluvium; this is consistent with the wider Katonga catchment (Aggrey *et al.,* 2010).

Land use is primarily agrarian. Crops include plantain (*Musa paradisiaca*), maize (*Zea mays*), coffee (*Coffea robusta*) and cassava (*Manihot esculenta*). Much of the valley is open grass or scrubland, with some plantations of eucalyptus *(Eucalyptus grandis*). Herds of Ankole-Watusi cattle (*Bos indicus*) graze the valley bottom. The FAO Africover program identifies the valley bottom as "closed to very open herbaceous fields with sparse shrubs on temporarily flooded land". There is a permanent swamp in the centre of the catchment with mainly emergent vegetation (including *Typha* spp., *Miscanthus violaceum* (K. Schum) Pilg. and *Phragmites* spp). Papyrus grows on the boundary of the permanent swamp (Fig. 1) but this has been declining over a number of years.

Land Use Changes

Land use change in the valley has been dynamic and has had a major influence on evapotranspiration loss from the wetland as well as groundwater levels. The area of wetland was previously much larger and bush land and natural woodland would have dominated much of the valley slopes. Drainage and cultivation of wetland started during the early 1900s (MLWE, 2005) primarily to provide grazing land. As the population has grown, the demand for raw materials increased with more clearance of papyrus and planting of eucalyptus. Such plantations adversely affect water tables in small valleys (Dye, 2000). Lowering the water tables exposes former wetland soils, causing them to dry out and be more accessible for grazing. This exposure has a damaging effect on wetland vegetation, particularly papyrus which is cut and harvested for human use and livestock feed. As a result permanent paths have been created throughout the wetland, allowing herds to move freely and graze the young papyrus thus preventing regeneration after later re-flooding (Morrison and Harper, 2009). These dry areas have expanded and have reduced surface water availability. They also encourage access into nearby wetlands, further aggravating decline. This cycle of degradation is illustrated in the diagram (Fig. 2). Water abstraction from boreholes affects water table levels, but the quantities of water used can only be estimated from the village

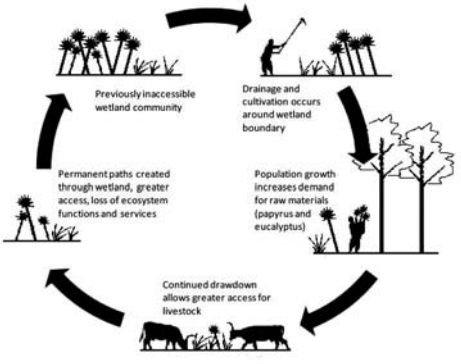

Figure 2. Papyrus degradation cycle

population and average daily household requirements of about 15 litres per person per day. Some villagers use water form outside the valley, while some collect rainwater.

Future Management

The increasing population and hence demand for food and raw materials makes it essential for better land and wetland management. Current patterns of use are unsustainable, and judging by current conditions, a number of distinct possibilities exist for future resource management in the valley:

1. The current vegetation cover remains unchanged and further cultivation does not extend beyond existing agrarian boundaries.
2. Eucalyptus plantations on the valley bottom are removed and the wetland areas restored.
3. Further efforts are made to extend the existing papyrus communities across the wetland and valley bottom (some residents already do this).
4. Eucalyptus plantations and cultivation is extended to the point where the wetland ecosystem disappears.

Complete cultivation (Scenario 4) would be detrimental to water table levels. The high rate of evapotranspiration from eucalyptus and reduced infiltration after conversion to permanent pasture would inhibit recharge to the groundwater. Removal of eucalyptus and restoration of wetland vegetation (Scenario 2) would allow the water table level to be somewhat preserved, potentially enhancing water supply and improving biodiversity. Papyrus communities, provided that the area of restoration is sufficient (Scenario 3), have the potential to further enhance the water table levels as a result of the hydrological efficiency of the plant. Studies have found evaporation from papyrus stands to be lower than from open water by as much as 35% (Rijks, 1965; Jones and Humphries, 2002). This lower evapotranspiration may be directed at reducing the amount of toxic ferrous iron being absorbed through the roots from the soil (Jones and Muthuri, 1984). The lower evapotranspiration from papyrus may also be enhanced by increased shading of open water.

Constraints

Local communities will need to be made aware of the benefits of sustainable wetland management.

Landowners in Makondo claim that eucalyptus trees are a vital source of building materials and fuel and therefore removing such plantations is seen as counter productive for development. However, papyrus could be an alternative source of fuel and materials. Papyrus is highly productive, with dry weight biomass production up to 30 t/ha (Perbangkhem and Polprasert, 2010). This compares to eucalyptus at 17 t/ha (Alder *et al.,* 2003). Based on these estimates, and the ability to rapidly regenerate after harvesting, papyrus communities should meet the needs of the community without eucalyptus plantations, provided the papyrus is utilised sustainably.

Most landowners feel that the greatest benefits could be gained from draining the wetlands to provide more land for cultivation. However, further discussions revealed that they had failed to link declining borehole and well yields with the disappearance of the wetland. When made aware of this relationship, most landowners wanted improved boreholes and wells rather than more land for cultivation, and were willing to convert pasture to wetland to achieve this. Some residents still wanted more arable land to support the increasing population. Thus, future management must ensure that both ecosystem requirements and community needs are met.

Climate Change

Climate change may impact wetland functions but land use change can be a causal factor of climate change (Dale, 1997). Experience from East Africa shows that socio-economic factors can impact natural resource management more than climate change and

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in the Makondo Valley increasing demands for food and raw materials drives land use change. The Intergovernmental Panel on Climate Change estimates temperature increases of 3.2-3.6°C for Uganda (IPCC, 2007), and rainfall may increase by 7%. It is possible that the effect of this increased temperature (and hence increased evapo-transpiration) could be offset by higher rainfall. Thus addressing non-climatic drivers of land use change should have high priority.

Restoration of the papyrus communities would contribute to improved water tables and generate ecological and economic benefits (Jones and Humphries, 2002). The ability of papyrus to trap sediments, recycle nutrients and store carbon (Knapp and Medina, 1999) lends further support to restoration. Increasing the papyrus communities will also provide a buffer against sediment in runoff from valley slopes, and protect water quality. Morrison and Harper (2009) proposed a number of measures to ensure effective re-establishment of larger areas of papyrus, including artificial germination and protection from grazing animals. However, other measures will be needed: blocking drainage ditches would be beneficial to allow greater inundation. This would also increase surface water storage and reduce the risk of colonisation by non-wetland vegetation. Cooperative schemes should ensure sustainable management through improved community interest and the generation of revenue from wetland products. The Uganda Wetlands Development Program (MWLE, 2002) has suggested approaches for community-assisted wetland development schemes, which could be administered through local community development centres such as those that exist in the Makondo area.

Conclusion

Sustainable land use practices in the Makondo Valley, and similar locations in East Africa, could improve the ecosystem services provided by wetlands. Decision-making must be placed in context and cater for the specific needs of rural communities and ecosystems. Some of the management options outlined above have the potential to improve the resilience of the Makondo Valley ecosystem to future climate changes. This resilience will conserve and improve existing water sources, generate economic benefits and thus play a key role in the development of the local community.

Wetlands in Uganda

Total land area of Uganda	241500 km^2
Total wetland area	30105 km^2 (13% of country)
Rural population without safe water	56%
Rural population below poverty line	96%
Average wetland area per person	0.2 ha
Proportion of wetlands used for agriculture	30%
A National Wetlands Program exists, but action is constrained by limited technology, knowledge and land tenure issues. As a result, mapping and classification of wetlands has been done in only 10 of the total 45 districts.	

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Mainstreaming Conservation Agriculture: challenges to adoption, institutions and policy*

Sustainable Production Intensification with CA

Conservation Agriculture (CA) is underpinned by a set of core agro-ecological principles that enable producers to intensify production sustainably while minimizing or avoiding negative externalities. CA is able to support and maintain ecosystem functions, and services derived from it, while limiting interventions required for intensifying the production to levels which do not disrupt these functions. Thus intensification with CA allows the harnessing of efficiency (productivity) gains as well as ecosystem benefits. CA offers benefits to all producers, whether they operate on small or large-scale farms, and to all types of soil-based systems of agricultural production, and to society at large (Pretty, 2008; Friedrich *et al.*, 2009; Kassam *et al.*, 2009; Pretty *et al.*, 2011).

These are:

(i) Higher stable production, productivity and profitability with lower input and capital costs;

(ii) Capacity for climate change adaptation and reduced vulnerability to extreme weather conditions;

(iii) Enhanced production of ecosystem functions and services;

(iv) Reduced greenhouse gas emissions and carbon footprints.

CA translates into a number of locally devised and applied practices that work simultaneously through contextualised crop-soil-water-nutrient-pest-ecosystem management at a variety of scales. According to FAO (2008), the adoption of CA has resulted in savings in machinery, energy use and carbon emissions, a rise in soil organic matter content and biotic activity, less erosion, increased crop-water availability and thus resilience to drought, improved recharge of aquifers and reduced impact of the variability in weather associated with climate change. It can also result in reduce production costs, leading to more reliable harvests and reduced risks.

However, CA represents a fundamental operational change to agricultural production systems and producers. It requires a wider awareness of ecosystems and the services they offer so that these are least disrupted when altered or used for agricultural production. The benefits of CA provide an indication why many farmers are adopting CA systems and why CA deserves greater attention from the development and research community as well as from government, corporate and civil sectors. However, not all synergistic interactions in the CA system are fully understood. In general, scientific research on CA lags behind farmers' own discoveries. This is partly because CA is a knowledge-intensive, comprising an

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interlinked set of practices that does not lend itself to easy scientific scrutiny through short-term research and reductionist approaches. Similarly, knowledge and service institutions in the public and private sectors tend to be aligned to supporting conventional tillage-based production systems. Further, there is limited policy experience and expertise to assist in the transformation of conventional tillage systems to CA systems for small and large farmers in different ecologies and national contexts.

Consequently, more enabling policy and institutional environments are needed to promote and sustain the development and adoption of CA. The principles of sustainable production intensification based on an ecosystem approach form the basis for good agricultural land use which includes the realisation that erosion of soil is a consequence and not a prime cause of land degradation. It indicates the need to respect and make best and careful use of agro-ecosystem processes, rather than simply replacing them with synthetic inputs and artificial interventions.

Adoption, Institutional and Policy Challenges

The key limiting factors on CA adoption and up-scaling are lack of knowledge, expertise, inputs (especially equipment and machinery), adequate financial resources and infra-structure, and poor policy support (Friedrich and Kassam, 2009; Friedrich *et al.,* 2009). Where a country or state is not currently generating the knowledge needed for the transformation towards CA, it must rely on successful experience outside its borders and support a network of on-farm operational research by pioneer farmers, backed by public advisory services, NGOs and research establishments. The engagement of the agricultural machinery sector is necessary to facilitate the supply of needed equipment.

Social capital is used as a term to describe the importance of social relationships in cultural and economic life. The term includes such concepts as the trust and solidarity that exists between people who work in groups and networks, and the use of reciprocity and exchange to build relationships in order to achieve collective and mutually beneficial outcomes. Social capital is thus seen as an important pre-requisite to the adoption of sustainable behaviours and technologies over large areas. Where social capital is high in formalized groups, people have the confidence to invest in collective activities, knowing that others will do so too. Farmer participation in technology development and participatory extension approaches have emerged as a response to such new thinking.

Policy support and cohesion to meet these aims is critical as most governments have a variety of institutions involved in natural resource management (e.g. agriculture, forestry, national parks, energy, water). The fragmented nature of their mandates often inhibits full effectiveness. On the other hand a commonality of underlying concern with the care of land, underpinning policy cohesion, will facilitate the needed interdisciplinary collaborations to be undertaken with farmers and other land-users.

Agricultural development policy should therefore have a clear commitment to sustainable intensification. All agricultural development activities dealing with crop production intensification should be assessed for their compatibility with ecosystem functions and their desired services. Tillage-based production systems do achieve some production objectives, but in many situations will not fulfil the requirement of long term sustainability and enhanced ecosystem services. Any environmental management schemes for agriculture (e.g. certification protocols, payments for environmental services) that do not promote the emulation of CA principles and practices are unlikely to be economically and environmentally sustainable in the long run. This does not mean that non-CA alternatives based on tillage agriculture cannot be considered in

new developments but when they are being planned for deployment, the results in terms of output, productivity and ecosystem services may be suboptimal.

Technology and Knowledge Challenges

A major bottleneck for the successful adoption and up-scaling of a different production practice such as CA is often the lack of knowledge and experience about the new production system. Site specific research and on-farm testing is needed to assist farmers in responding to system changes such as in nutrient requirements, crop protection problems and in options for green manure cover crops to be incorporated into crop rotations. The fastest development of suitable technologies is usually achieved through groups of innovative and pioneer farmers who exchange their experiences through specific networks, and thus build social capital.

A particular bottleneck for wide adoption is the availability of suitable equipment for CA. While small-scale CA can be undertaken without special tools by just using a narrow hand hoe or planting stick, the full benefits of labour saving and precision work can only be achieved using special equipment or tools. Equipment exists at all mechanization levels and sizes, but local availability for the farmers in most parts of the world is a real constraint. Even where this equipment, such as no-till planters, is available, it often requires a considerable initial investment for the farmer. These bottlenecks can be overcome by facilitating input supply chains, working with local manufacturing and contractor services, or sharing equipment among farmers.

What can be done to address the challenges?

Governments should make a firm and sustained commitment to encourage and support CA, expressed in policies that are consistent and mutually reinforcing across the spectrum of government responsibilities. This includes the mainstreaming of CA in public advisory, research and education services while being sufficiently flexible to accommodate variability in local ecological and socioeconomic characteristics. Financial and structural assistance to farmers can be justified by recognition of the public good value of environmental and socioeconomic benefits generated by CA.

CA is knowledge intensive and those who promote it or practice it require training. Learning about the new way of farming will be required not only by farmers, but by all stakeholders in agricultural production, including research and education, extension and training, comprising not only the agronomy but also the existence and handling of the new technologies and equipment options.

National and international knowledge systems must increasingly align their work in research, education and extension to helping to promote CA systems and practices. Research in particular must help to solve farmer and policy constraints to CA adoption and spread, and must go beyond academic and reductive comparisons and analyses of different systems. The greater impact that can result from the adoption of CA as a matter of policy and good stewardship is that agriculture development in the future everywhere will become part of the solution of addressing national, regional and global challenges including poverty, resource degradation, land, water and energy scarcity, and climate change.

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The prosperity of the human race may soon depend on it becoming more vegetarian

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Introduction

Many experts in animal evolution consider that the speciation of the human race happened in southern-central Africa some 100,000 years ago, as a branch of the several species and races of primates then existing on the planet. Among the several morpho-physiological characteristics of the modern man, his omnivorous digestive apparatus played a fundamental role in adaptation to a hostile environment, where large predators and abundant pathogens and parasites were present. Having the ability to digest meat of captured animals or of remains of animals killed by other predators, as well as many different plant products, made it easier for the human race to survive and multiply, in its phase as a "hunter-gatherer".

After the end of last glaciation, the human race developed both as a "shepherd", domesticating mainly herbivorous animals and as a "farmer", cultivating and domesticating several plants. These provided seeds and various plant products of short, medium and long conservation, enabling "self-domestication" to progress more rapidly, because of safer and longer food availability for greater numbers of people. The end of the last glaciation, some 10-15 thousand years ago, allowed the spread of the human species to many other areas of the planet where better and easier environmental conditions were able to provide food for their colonization.

The demographic explosion

From the African continent, the human race slowly colonized other northern areas in the Mediterranean basin and then the Eurasian continent, reaching Australia and the American continent some 25-30 thousand years ago. In this phase, the size of the human population was strictly correlated with food availability in the areas to which it had spread. It is estimated that, in such a period, the human average lifetime expectancy was around 25-35 years. Even now, in some areas of very poor countries such as Haiti, Eritrea, Cambodia, Madagascar, the average life expectancy is similar, also because the child mortality is still very high.

Until the year 1000, the total world human population was estimated at around 100-250 million. From the year 1000 the population doubled during the next 600 years (becoming 500 million); a further doubling was reached 200 years later (1 billion in 1800); the population then reached of 2 billion after the next 100 years, then 3 billion in 1950 and then 6 billion in the year 2000 (a typical exponential increase in the last 300 years, happening mainly in developing countries).

In the meantime, life expectancy in some developed countries such as Italy and Japan reached 80 years. Some specialists are forecasting that in such countries the average life expectancy could be a century in the future.

In developed countries, the amount of food consumed by each person in recent decades has greatly increased. After the end of normal body growth (in humans some 20-25 years old) food is required primarily for supplying the energy needed for normal activities; if an excess of food is taken, obesity cannot be avoided. The number of obese people in North America is now very high (33% in USA, 24% in Mexico, 23% in Canada); in Europe it is between 15% and 23% in 6 countries. In Italy Belgium, Denmark, Norway and Netherlands it has now reached 10%. Moreover, in every developed country, the amount of unused food found in the garbage continually increases.

Plant and animal breeding together with research and development of mechanization, biology, chemistry, etc., particularly during the last century, has enabled great progress in levels of productivity (maize productivity is more than 10 times higher). This has allowed much of the population, including that in many developing countries to eat much larger amounts of meat, milk, eggs and derived products, even in comparison with the recent past.

The population in developing countries increased by 2.1% each year from 1970, while the total average meat consumption increased by 5.4% in the same period (with an increase from 14 kg in 1983 to 21 kg in 1993). The total milk consumption increased by 3.1% yearly (from 35 kg per person to 40 kg in 1993), even though such an amount is less than 25% of the consumption per person in developed countries. In some areas such a trend has been even larger over the last 10 years. In Brazil the meat consumption increased from 41 kg per person per year in 1980 to 80.8 kg in 2005.

Moreover, despite the rapid development of agricultural production, an even more rapid development of urbanization (now more than 50% of the total world population live in urban areas), of industry, trade, and services, with a continuous erosion of land that only 50 years ago was normally used for food production. Nowadays each Italian has only 2000 m^2 of agricultural area available for food production, when it is well known that, for feeding a person in an average environmental condition, we need more than double this area.

Every day, now in Italy, some 160 ha of former agricultural land are utilized for new buildings. In addition to this lost agricultural area, a large amount of former agricultural marginal land is not cultivated because now the achievable revenue does not cover the cost of production. In addition, in Italy, very few young people are now willing to become farmers, due to long working hours, the need for capital advance, difficult environmental conditions and lack of some basic services in rural areas. To all this, it should be added that, in Italy, 60-70% of the production of meat, milk and eggs is obtained in “bio-factories” with feed produced with imported corn, barley, wheat, soybean, pea, etc. Soybean, in particular, is witnessing a spectacular increase of consumption (not only for animal feeding, but also for food and biodiesel production) in Asia and in North and South America, besides Europe. This will certainly lead to an ever increasing cost of soybean and soybean products (oil and protein flour) and to their direct utilization in soybean producing countries for cheaper meat production. As a result the much lower cost of frozen imported meat could seriously hamper the local livestock production in Europe.

The logical consequences

The demographic world increase (now reaching 7 billion people); the expected negative climatic changes; the steady decrease of cultivated land; the continuous increase of urbanisation; the increase of the quantity and quality of food requested by the

increasingly affluent populations in large countries such as China, India, Indonesia Brazil, Argentina, and Russia; the recent massive utilization of cereals, particularly of corn and wheat, in USA for bioethanol production; the increasing costs of water for drinking and irrigation; the too rapid application of food product market liberalization, are all factors which will lead to a future increase of the cost of basic food products (and particularly of animal food products and of a decreased availability of several more expensive products. As always the biggest advantages will be to trade, processing and distribution and much less to production.

In developed countries, meat, milk and eggs are produced by several billion domestic animals, particularly those housed in "bio-factories", that utilize enormous amounts of carbohydrates, proteins and lipids derived not from grasses or pasture crops, but from cereals and grain legumes. These could feed billions of people directly, particularly in the poorest countries. Nearly two thirds of fertile lands of the planet are planted with crops used for feeding domestic animals (FAO and USAID data). In Europe, 77% of cereals produced are used by animals, in USA 87%, while in the poorest countries only 18% is used for the animal food.

In summary, at world level, 90% of soybean and 50% of all cereals produced are used as animal food. Moreover, water usage for production of feed is between 500-2000 litres per kg of harvested product. Domestic animals directly use only 1.3% of the water utilized in agriculture; however, the amount of water needed for growing cereals and forages used for animal production is much larger. For producing 1 kg of beef in intensive factories 100,000 litres of water is needed, double the quantity needed for animals in open pasture; for producing 1 kg of poultry meat 3500 litres are needed. For crops: 2000 litres are needed for 1 kg of soybean, 1910 for rice, 1400 for corn, 900 for wheat and 500 for potatoes. In fact, domestic animals are treated as "machines" for converting crop proteins into animal proteins but are very inefficient as food transformers/producers. The ratio of conversion of proteins of animal feeds to food for man varies from 1:30 to 1:4 depending by the animal species considered.

The number of people that can be supported by basic food production per hectare over one year varies from 22 for potatoes, to 19 for rice, but only 1 for beef or 2 for lamb. Moreover, the digestive process of billions of these ruminants introduces large amounts of methane and nitrous oxide into the atmosphere, which contribute proportionately more than carbon dioxide to the greenhouse effect. If we continue to destroy forests to produce animal food, particularly in the tropics, the effect on climatic conditions, already significant because of the increasing use of fossil fuels, will certainly worsen.

Browsing animals growing in open pastures, utilizing grasses and vegetation not directly edible by man have a less negative balance. However, the breeding of such animals in developed countries is now less common than growing animals in specialized "bio-factories", using grains that could provide good food to millions of children now malnourished.

It seems obvious that, among the different types of animal products the most rapid and consistent decrease should involve meat production, rather than milk or egg production. This is both for ethical reasons, but above all, for stringent and fundamental reasons; social (food security), economical (food cost) and political (peace and stability). Recent events in several North African and Near East Countries, some compounded by basic food shortage, are a strong signal. Today, more than 800 million people in India, in a country with rapid and extensive social and economic development, are strictly vegetarian: it demonstrates that we could all utilize better the cereals and grain legumes now so largely utilized for feeding animals.

Research and selection should be aimed at

improving animal efficiency in transforming crop proteins into animal products. It should also target the development of new technologies to produce plant protein that is more refined and tasty (better milk and cheese from soybean and possibly from other grain legumes), also for use in mixtures with animal milk and meat, for greater acceptability. This also applies to products from cereals and grain legumes; for example, up to 30% of added soybean proteins are used in industrial hamburgers. More research should be addressed and properly financed to achieve these new goals.

Diversity of food consumption already exists across the globe as staple foods for Europeans are wheat, rye and potatoes, Latin Americans utilize maize, beans and potatoes, in Asia rice, wheat, sorghum, millets, soybean and other legumes, in Africa sorghum, maize, cowpea, millets, etc. By directly utilizing plant food, with many plant products rich in antioxidants, vitamins and many nutrients of high value, we could reduce health problems derived from obesity, excess of sugars (diabetes), and excessive consumption of animal fats and cholesterol.

The topics discussed should receive more attention, in order to prevent possible negative effects on agriculture, on our nutrition safety and food security, with relevance to the general wellbeing and economic welfare of the population. We need to involve animal breeding and nutrition experts, so as to approach these problems in intelligent, gradual and rational ways, and thereby offer valid alternatives to producers and consumers. As usual, it is better to prevent than to cure. Besides improving the utilization of plant products, we should also try to promote the cultivation of the seas in a sustainable way to increase the utilization of the immense food products offered by marine biology. The development of aquaculture, a greatly underrated controlled practice of marine biology farming, also needs to be promoted.

The following two articles were papers given at the South-West Group AGM at Exeter, 6th January 2011.

The Pakistan Flood of 2010: its consequences for agriculture and the International response

John Hansell

John Hansell studied geology, soil science and tropical agriculture. He has a vast experience in agriculture and rural development in a large number of countries in Africa, Asia and the West Indies. Recently in Pakistan as a humanitarian adviser working on agriculture early recovery and community restoration. Working with FAO and WFP to design and prepare documentation for DfID funding.

Unprecedented monsoon rains

Heavy persistent rain 19-21st July caused flash and highly destructive riverine floods in the north and north-western regions of Pakistan (parts of Khyber Pakhtunkhwa (KPK), Gilgit Baltistan, Balochistan, and Azad Jammu and Kashmir. Initial reports of flooding in the north from Swat indicated damage to the Amandara head works and the washing away of the Munda Headworks, both major irrigation structures

Flooding was initially seen as localised and there was a short break in the weather for 2-3 days but from 27th there was a further period of continuous heavy rain for 48 hours. Further storms continued to add to the runoff into August. The high-intensity rainfall in KPK generated flood peaks in the Swat and Kabul Rivers and unprecedented flows into the Indus River causing severe damage. At the same time the second period of rainfall had caused the eastern rivers Neelum, Jhelum and Chenab to swell and as these rivers combined and joined the Indus they created a slow moving body of water equal in dimension to the land mass of the United Kingdom travelling southwards. The flood waters travelled downstream with extreme high floods recorded at the Chasma and Taunsa barrages. Fortunately the British built Sukkur barrage in northern Sindh held despite years of under investment.

Many of the main irrigation canals that take water from the Indus River were flooded, pouring water onto agricultural lands. In the Punjab the left (east bank) was most badly affected. In Sindh, the situation was compounded by the breaching of major canals and embankments and the diversion of the water. In an attempt to prevent flooding of urban areas deliberate breaches to the Tori Bund led to the Indus overflowing on the west bank and down an abandoned channel into the Manchar lake where it was impounded and unable to flow back into the Indus.

The floods that started on 20th July in the north were to reach their peak only on 16th September as the water continued through the barrages in Punjab and Sindh until they reached the Arabian Sea. This was the worst flooding to affect Pakistan in its history, the most widespread since 1929 and the most destructive ever experienced in terms of cost. For the first time in decades the Indus had broken free and recaptured its flood plain.

Impact

The National Disaster Management Authority (NDMA) has estimated that the floods affected seventy-eight districts and covered over 100,000 square km. The floods affected more than 20 million people, (over one-tenth of Pakistan's population) with over 1,980 reported deaths and nearly 2,946 injured (the majority of the deaths occurred during the torrential flash flooding in the north). About 1.6 million homes were destroyed, and 2.3m hectares (about 10% of Pakistan's cultivated area) of crops and agricultural lands were damaged. More than a million animals mainly sheep and goats were lost and an estimated 6m poultry.

During September and October teams from the World Bank and Asian Development Bank carried out a Damage Needs Assessment. This reported that direct damage caused by the floods was estimated US$ 6.5 billion while indirect losses amount to US$ 3.6 billion.[1] The agriculture and livestock sectors suffered the highest damage calculated at US$ 5.0 billion.

Housing Damage $1588 million

An estimated 913,307 houses have been completely destroyed and another 694,878 partially damaged. As expected, the extent of damage incurred to katcha houses has been far higher at 19 percent of the pre-disaster katcha housing stock (1.45 million housing units), out of which, 847,455 katcha housing units have been completely destroyed. Among provinces, the housing stock in Sindh has been the worst affected, with almost 880,000 housing units completely or partially damaged, which is 55 percent of the total affected housing stock across the country. By contrast, only 3 percent of total pucca housing stock (156,000 housing units) has suffered damage, with about 65,000 being completely destroyed.

Agriculture: the most severely affected sector $5045 million

Accounting for a full 50 percent of the estimated cost of overall damages. Damage and losses to the sector are estimated to be around Rs 429 billion most (89 percent) of which are attributable to cropped agriculture.

Table 1. Agricultural Crop Losses

Province	Area (hectares)	Value ($ bn)
Sindh	1,043,000	4.30
Punjab	747,000	2.58
Balochistan	132,000	0.62
KPK	121,000	1.17
AJK	33,000	?

Around 80% of people in the rural areas depend on agriculture for their livelihood. Most are small-scale farmers cultivating a few acres. Assessments indicate that most who lost farm assets (animal feed/fodder and shelter), lost them all. Importantly, the loss of home-stored wheat seed – the major staple crop and other seeds critical to food security – were spoilt or washed away.

Almost 57% of households had their main source of income reduced by between 75-100%. In addition, there was extensive damage to agricultural infrastructure, especially irrigation, heavy loss of small tools and machinery, while stocks of stored grain, seed, fodder and straw, were washed away

As the majority of the crops affected by floods were kharif summer crops ready for harvest, almost all the damages can be taken as loss in sub-sector value added. Some 870,000 ha (30%) of the rice crop was lost much of which was export quality basmati. Initial figures for high losses in the cotton crop of up to 2.0m t were later downgraded as some crops survived a short period of inundation and farmers delayed harvest and picked later. Sugar cane providing it had reached sufficient height, managed to pull through but with decreased yields.

[1] **World Bank and Asian Development Bank Disaster Needs Assessment**

Direct Damage refers to the monetary value of the completely or partially destroyed assets, such as social, physical and economic infrastructure immediately following a disaster. Wherever possible, the direct damage for assets is assessed in "as was" condition, i.e. at their book values.

Indirect Losses are income losses, and comprise both the change of flow of goods and services and other economic flows such as increased expenses, curtailed production and diminished revenue, which arise from the direct damage to production capacity and social and economic infrastructure.

Table 2. Losses of Major Crops (million tonnes)

Sugar Cane	Rice	Vegetables	Cotton	Maize
7.5	2.5	0.8	0.7	0.3

Table 3. Animal Deaths by Province

Province	Large Animals	Sheep and Goats
Balochistan	139,600	1,036,700
Sindh	93,700	81,900
KPK	72,400	67,800
Punjab	2,300	2,500
FATA	6,200	8,400

Although the livestock sector suffered some heavy losses the overall direct and indirect losses in the sector are estimated to be only 3 percent of sub-sectoral value added. As such, despite the loss of large numbers of animals, value-added in the sub-sector is expected to decline only by 0.6 percent.

The Flood Emergency Appeal

In August 2010 the UN launched an initial appeal for US$ 459.7 million to finance Pakistan's Initial Flood Emergency Response Plan. As the floods continued southwards and more people became affected a revised appeal (the UN's largest ever humanitarian appeal) was launched on 17th September for US$ 1,938m to finance projects supporting essential sectors such as shelter, food, water, sanitation, hygiene, and agriculture for a period of twelve months. The appeal was followed by a high-level meeting on Pakistan's flood crisis, hosted by the UN Secretary-General and intended to highlight the international community's solidarity with the country during this crisis

The immediate need during the flood was for food and shelter. By September the World Food Programme estimated that 10.1m people needed food assistance and shelter. Since then WFP have been providing monthly food rations to between 6-7.5m people/month the rest being covered by many others: the military, international and local NGOs and private benefactors. The numbers requiring food assistance are only expected to fall below 5m from February by which time food (either directly or through cash and Food For Work) will be supplied largely to those who have returned home and need food while recovering their livelihoods. Despite the size and scale of the flooding and the international interest it aroused by the end of 2010 only 52% ($975m) of the appeal had been met.

Table 4. Allocation of FERP funds by sector (by end December 2010)

Sector	Appeal request ($m)	Funding to date ($m)	Percentage covered
Food	573	348.8	59
Agriculture	170	91.5	54
Shelter/NFI	322	94.0	29
Watsan	244	81.0	33
Health	243	98.0	40
Economic recovery/ Infrastructure	180	20.6	11

Major donors to date have been:

USA $671m (33%)

Private donations $320m (16%)

Saudis $151m (7.5%)

UK and Japan $114m each (5.5%)

Soon after the relief phase was underway the UN and donor partners began to consider the need for early recovery programmes to get people back to their home areas and to identify income earning opportunities. To kick start agricultural production and ensure the rapid restoration and recovery of agricultural-based livelihoods, well targeted and time critical strategic interventions were required. Wheat is the main winter “rabi” crop amounting to 2/3 of all cereal consumed in Pakistan and the planting season is narrow (October/mid-December) depending on the climate zone. Any delay results in reduced yields. If the winter crop was not planted food security would be further undermined and lead to longer-term dependence on external food aid.

Using similar programmes to those that had proved successful after the 2007 Sindh floods, FAO requested funding for the distribution of seeds, urea and DAP fertilizer. To date over 560,000 vulnerable flood-affected farming families have been reached with seed and fertiliser sufficient to sow 1 acre, sufficient to

meet the household wheat requirements for an average family. In parallel the Government of the Punjab with national food security in mind has been implementing a similar programme of wheat seed distribution, issuing cleaned grain rather than seed wheat and providing a larger amount for farmers with up to 25 acres. In areas of Sindh where the wheat season has been missed due to the flooding, alternative crops such as sunflower are being identified

Saving surviving livestock is also time sensitive; if delayed there will be distress sales and slaughter rates will increase. Ensuring the survival and health of animals is essential as they are the real property of the poor acting as a buffer and providing protection in times distress while providing a ready source of nutrition and income from sales of meat and milk. Recognising the need to protect and restore the productivity of the surviving livestock FAO and NGOs provided fodder, feed concentrates and de-worming medicines to affected families, particularly in Sindh. Feed for one large or two small animals sufficient for 3 months was supplied to 255,000 households.

Importantly, given the need to ensure restart family food production all families receiving seed and livestock packages were also provided with a vegetable seed pack sufficient for a quarter of an acre for home garden planting.

The UK Contribution

Up to the end of November the UK had committed £134m towards flood relief and early recovery. To its credit DFID was one of the first donor agencies to come forward with a substantial sum in response to the initial appeal allocating £64m during August. None of this money went through the GoP but was channelled through a mix of UN and NGOs largely to meet immediate needs of food, shelter, Watsan, health and logistics support. Very little at this stage was allocated to agricultural recovery

Following the revised appeal in mid-September early recovery and rehabilitation became paramount and the UK announced a further £70m in aid. DFID immediately provided £8m towards expanding the FAO seed and livestock programmes. Shortly after DFID allocated £20m to the Consortium of British Humanitarian Agencies for a range of recovery programmes that would ensure:

- Families had access to immediate income and means for a sustainable return to their home areas. A range of interventions to rebuild homes, clean and repair community assets (infrastructural and agricultural). Support for the very vulnerable through cash grants of up to Rs 5,000/month for up to two months. Cash for Work programmes that provide 40,000 households with up to 20 days work putting cash in their pockets while simultaneously rebuilding their productive assets or essential irrigation infrastructure. Activities such as repairing roads and markets, preparing agricultural fields and cleaning of irrigation canals will contribute to increased transportation, economic productivity and interconnectedness of the flood affected areas.
- Households had access to means to preserve existing agricultural assets and resume farming activities. Provision of inputs necessary to prepare and cultivate land in readiness for the kharif season. As many as 37,460 households will receive seeds, saplings, fertilisers, grain storage bins and agricultural tools either through direct provision, conditional cash grants or vouchers. A further 26,890 households will be assisted to increase their livestock assets including poultry restocking, access to fodder, vaccinations, de-worming, livestock shelters and related training.
- The resumption and revival of non-farm micro- and small-businesses. Support to this sector of the local economy will allow non-farm but often agriculturally related businesses to recover as well as increasing opportunities for income-earning in flood prone areas. The project will target 5,660

small enterprises in value chains/markets that are strategic for rehabilitation and reconstruction with a mix of financial and non-financial support through cash grants, specialist tool provision and skills training. Technical support and skills training will also be provided to 5,260 home-based businesses, many of which will be run by women, allowing them to earn an income and support their families.

The impact of the floods on national food security

With this level of damage it is inconceivable that the floods will not have a substantial impact on the economy. Despite lower than predicted losses the value-added in crop agriculture, which was targeted to increase by 3.5 percent in 2010/11, is now projected to decline by about 10 percent (from the level of 2009/10), with major crops showing a decline of about 7 percent and minor crops of 20 percent. The expected fall in cotton production in the Punjab led to a marked peak in international cotton prices.

Economic growth is likely to suffer a significant deceleration; the impact on prices is already evident with monthly inflation registering the highest increase in over two years. Public finances will also be affected due to large-scale increase in flood-related expenditures.

While there will be localised problems with accessing food particularly by the poorer sections of the community there is unlikely to be a national food shortage. A bumper wheat harvest in 2009/10 on top of existing high stocks of wheat ensure that supplies of cereals are sufficient to meet Pakistan's needs at least until the 2011 wheat harvest in May/June. Indeed the high cost of storing an estimated 6-8m tonnes has led to calls for a resumption of wheat exports given the prevailing high price of wheat in world markets.

Lewis Wallis

Lewis Wallis was with the Commonwealth Development Corporation working on projects in many countries in Africa and Asia and then five years in the London office concerned with natural resources projects overseas. Since retirement has been involved with the Farmers Dialogue programme, visiting Ukraine and other Eastern European countries.

Farmers Dialogue

When the wall separating East and West Europe came down in the late eighties, travel restrictions were lifted which allowed people from many countries to visit and learn about each other's way of life. For westerners came the opportunity to see and experience for themselves the effects of years of communism. The reverse was also true but was not encouraged by the authorities.

The election of a new and democratic parliament in Ukraine was followed by a visit to UK of ten new Parliamentarians who were hosted for a meeting at the Westminster Theatre in London and then owned by Moral Rearmament (MRA). Contentious issues were touched upon such as Land Tenure and the role of the State in Agriculture.

Initiatives of Change (IofC) is the successor to MRA, and Farmers Dialogue is a programme of IofC. Led by farmers from Britain, France, Canada and Switzerland, efforts were made to bring scarce Independent Farmers of Ukraine together. It took some thirteen years before a formal Dialogue was held in Krinichke in the Dnepropetrovsk Oblast on the former collective farm Suvorovo now renamed LADA Krinichke Ltd. The Dialogue was held in an old barn in deep winter which is the only time farmers are able to meet together. There were farmers from France, Britain, Poland and Ukraine. All aspects of grain production and marketing were discussed at length and farm and off-farm visits were made.

In India at Asia Plateau the old farm which originally provided food for the IofC Centre at Panchgani has been the venue of Indian farmers Dialogues. The poultry and dairy units closed long ago and the buildings remained empty. They have now been transformed into a Rural and Ecology centre focussed on India's rural villages and their governance. Reforestation of India's denuded landscapes is encouraged with a strong emphasis on saving the Western Ghats from total destruction by mining and industry. A typical farm in India is difficult to describe; many are very small and marginal and subject to failure while others are owned by rich farmers, especially if they have good jobs in the burgeoning cities. Biogas production, solar and wind generation are topics alongside the weather, soil, markets, prices, costs, and all the other factors that are important to farmers worldwide whose aims are to feed the world, maintain soil fertility and pass on the means of production to future generations. These aims are embodied in the Farmers Charter which can be found on the Farmers Dialogue website.

Farmers Dialogues in Africa have been held recently at Bungoma in Kenya and in Uganda. Gender is often a major determinant of debate. The East African team are planning a Dialogue in Rwanda, to which it is hoped farmers from other African countries will be able to participate, contribute and benefit. Some financial help for these dialogues comes from the farmers' families that provide food and lodging to their fellow farmers. IofC is active in wider dialogue bringing together people of different faiths, ethnic groups, gender, generations, tribal and other groups. Farmers Dialogue is now a part of the Food and Sustainability Group of IofC which addresses the problems associated with rapid population growth and urbanisation. Can we as farmers be certain we will be able to feed a

projected world population of 10 billion mouths, all competing for the produce from a dwindling resource of suitable land? In Britain, the closure of agricultural colleges like Seale Hayne and Wye College is surely a dangerous decision to have been made. Britain produces a smaller percentage of its food and has been reminded many times of the folly of relying on imports above domestic production.

In its early days, the Commonwealth Development Corporation (CDC) engaged in agricultural development in many developing countries. It provided finance, management and training in many disciplines including agriculture of many kinds. Following its government approved metamorphosis, profit appears to be the driving force. The editorial in Agriculture for Development in autumn 2010 entitled "CDC forgets about Poverty Relief" had the following highlight, "Let us hope..... DFID has the foresight to ensure that British aid to Third World agriculture and rural development regains its rightful place in the poverty arena". Comfortable, urban Britain is unlikely to elect a government with the vision of the post-World War 2 decision to set up the CDC. Will our military men in Iraq, Afghanistan and elsewhere be followed up by farming experts? Great work is being done by the major charities like Action Aid and Christian Aid, but their work is often Advocacy. Only Farmers can put food on the world's tables or fill hungry stomachs.

The year 2011 started with a Sunday evening service in Westminster Abbey to pray with the people of Haiti on the first anniversary of the earthquake which destroyed the capital Port au Prince. The slums are there largely because of the failure of Haitian agriculture and the steady migration of desperate Haitian farmers driven out by hurricanes and economics outside of their control. Their plight was highlighted the previous week in a Committee room of the Houses of Parliament with a forthright statement which included a Haitian agronome. Haiti needs outside help to get its agriculture up and running again, and Britain has the knowhow. To a former CDC employee engaged in agricultural development, the needs are obvious. The task is enormous and must not be evaded.

Southern Sudan has just voted to become the world's newest nation with great resources of people and nature which are being greedily envied by many countries. Pakistan will also need support following its earthquake and floods. Farmers Dialogue will continue to engage with farmers and politicians to sustain food production in many countries and invites others to join in. Please visit the website www.farmersdialogue.org or contact Lewis on landhwallis@fsmail.net

Newsflash

Corresponding author Dr Stephen Hallett, WOSSAC Coordinator (s.hallett@cranfield.ac.uk) and Ian Truckell (i.g.truckell@cranfield.ac.uk) are staff members of the National Soil Resources Institute at Cranfield University. Dr Ian Baillie (i.baillie@tiscali.co.uk), Brian Kerr (bkerr47@yahoo.co.uk), and David Billing (david_w_billing@yahoo.co.uk are TAA members who work on WOSSAC. WOSSAC's web portal is www.wossac.com

The World Soil Survey Archive and Catalogue (WOSSAC)

Moving legacy soils materials from preservation to dissemination

An invitation from the Editor to update readers about developments at WOSSAC (the World Soil Survey Archive and Catalogue, www.wossac.com) since our last note in the TAA Newsletter in 2005 is most welcome as we have made significant progress recently, some of it due to initiatives from TAA members. Readers may recall that WOSSAC, launched in 2004, is a repository held at Cranfield University, UK for the old and irreplaceable soil survey reports and maps that were mostly produced by British surveyors, departments and companies in overseas territories. Some items held date back to the 1930s, the majority from the early to mid 1970s, and many of the few remaining copies of these precious items were at risk of being lost forever. Today, WOSSAC comprises an organised collection of some 22,000 catalogued soil and land-related items representing some 270 territories worldwide. The collection comprises artefacts including maps, surveys, reports, photographs, imagery and field notes.

Figure 1 Part of the WOSSAC soil maps collection

In reporting on progress, it is appropriate to record our appreciation of the sterling efforts of the late Professor Peter Bullock, who died in early 2008. He was very much a hands-on worker in the early days of WOSSAC, undertaking many of the mundane and unglamorous tasks. However, it was his background and status as an Emeritus Professor, former President of the British Society of Soil Science, Director of the Soil Survey and Land Research Centre at Cranfield, and Chairman of the International Commission on Soil Micromorphology that enabled him to make his unique contribution to WOSSAC. He steered us wisely (and humorously) through the rarefied upper administrative reaches of the university, academic societies and the EU, and was instrumental in securing initial seed-funding and professional and academic recognition. Cranfield University recently honoured Peter by renaming the main soil survey building as the 'Bullock Building', and several TAA members attended the dedication ceremony.

WOSSAC sees its core mission in three linked tasks: simply the collection, preservation and dissemination of overseas soil survey materials (Figure 1). To achieve this WOSSAC is progressing through a sequence of activities (Figure 2). With the ultimate aim of seeing the many 'legacy' soil survey materials now 'repurposed' in contemporary information systems designed to hold and manipulate these and other data, which are compliant with emergent international standards for soil data specifications, metadata and data discovery, web services and reporting tools all supporting a broad range of environmental application thematic areas.

Figure 2 WOSSAC Development Stages

The collection and preservation activities continue apace, and the early response from individual soil surveyors, including many TAA members, has been sustained with continuing donations of reports and maps from many personal and institutional collections. These materials are catalogued and archived. Although dis-

ruptive at the time, the closure of the Silsoe campus in 2008 and the move of the collection to superior premises on Cranfield's main campus have facilitated the archiving process. The archive is now housed in a secure, well-lit hall with industrial scale roller shelving and many large format map cabinets. To date, over 22,000 items have been catalogued and shelved, with new accessions keeping the 'inbox' (actually several metres of shelf) perpetually full. Bibliographic details of all items so far archived can be accessed on our web portal (www.wossac.com).

Collection and preservation inevitably took priority in the early stages, but we have always been conscious that this was only a component in a wider vision to see the materials gain the widest usage. Our aim is that the materials be made accessible to those parties requiring such information for policy support, research, development, planning, extension, and community action in the territories concerned. This has meant that documents and maps have needed to be captured in electronic form by initial scanning and then posted on via the project web portal. Scanning is a slow, expensive process that has to be resourced by externally-funded projects. These are now beginning to materialise, and we have recently completed the scanning and delivery to UNEP of all the archived documents and maps relating to Sudan. In the end this totalled some 2,300 documents requiring over some 100Gb of digital storage. Procurement of this project owed much to the initiative and drive of TAA member and UN Consultant Neil Munro. We are also completing a similar but smaller task on WOSSAC's holdings of Tanzanian materials, for delivery to the EU, as a contribution to the African-European Georesources Observation System project 'Aegos'. This required a further 32Gb for some 400 documents. Following on from this, as an initial contribution to the 'GlobalSoilMap.net' project, we are currently in the midst of assembling our digital items on Jordan. In addition we also respond to individual queries from researchers and planners.

The archiving and scanning activities have presented the project with several unexpected, practical problems. One interesting finding has been that whereas paper records represent a durable and flexible medium, obsolete digital information using redundant media and data formats can be near impenetrable without specialist knowledge and equipment. Extracting data from of superseded magnetic tapes, floppy discs microfiche etc have taken time, ingenuity and access to ancient hardware. Similarly old formats need the appropriate, obsolete, and often command-driven software. Paper does also have its issues however, and many of the older documents are fragile and faded with bindings having become brittle, breaking readily. Scanned paper documents are now stored loose leaf in flat-lying, sealed acid-free bags.

Whilst the scanning projects described above have provided an important evolution for WOSSAC, we are nonetheless still tackling our dissemination task in effectively an arbitrary and piecemeal fashion. We are in great need of assistance and the resources to scan the archive systematically for its future dissemination. Many of the surveys were originally funded by DfID or its predecessors, and scanning the outputs unlocks, at very modest cost, the full further value of monies already spent, quite apart from the fact that the information held covers many territories that are today relatively inaccessible or dangerous to work in. We have approached DfID for support for the scanning action on several occasions, but have been unsuccessful to date.

We appreciate the continued support from TAA and its members. We do welcome donations of any soil survey-related materials and assure donors that their documents will be securely preserved, systematically catalogued and, eventually, widely disseminated. Our web portal also provides tools to allow users to interact and update our catalogue entries allowing knowledge to be captured. Some TAA members have delivered their material donations in person. We appreciate this and it enabled us to show them the archive and how the cataloguing and scanning are undertaken. Further visitors are welcome if we receive sufficient notice.

The Food Crisis Continues

(Extracts from a roundup of the media's reporting on the subject by BBC Monitoring on 21 February)

As the UN's food price index in January reached its highest level since records began in 1990, the World Bank has warned that soaring food prices were at "dangerous levels" and threatened further political instability, echoing a view held by many commentators in the media. Finance Ministers of the G20 in Paris on 18 February addressed the problem of rising food prices that is widely seen as having sparked rare uprisings in the Middle East and protests elsewhere. The G20 meeting ended with a commitment not to implement any protectionist measures

in light of rising commodity prices but the South Korean news agency Yonhap pointed out that major food-supplying countries have already halted grain exports as they seek to secure sufficient supplies amid rising demand and prices; the agency gave the example of Russia and Ukraine which have "totally or partially" banned exports of some grains.

As the G20 meeting kicked off, thousands marched on the Bolivian capital La Paz to protest soaring food prices. Bolivia's Los Tiempos reported that the government was also facing strikes and protests in seven of Bolivia's nine departments. President Evo Morales had a week earlier been forced to abandon a public event in the face of an angry protest over food shortages and price rises.

An editorial in the Chinese news agency Xinhua argued that the impact of food prices is distressing for the poorer countries while almost minimal for the rich. "In some of the poorest countries in the world, people spend a significant portion of their household expenses on food and will feel the pinch as soon as food prices rise". Thailand's The Nation website also pointed out that when commodity prices rise, the poor can only revolt – because they are forced to spend 50 to 80 per cent of their wage on food and other basic necessities. Elsewhere, Cuba's Communist Party daily, Granma, described the "exorbitant rise in international food prices" as being "as costly as the passage of several hurricanes through national territory".

Moscow-based TV K+ reported that countries of the Central Asian region had been severely affected. Wheat prices had risen by over 40 per cent in Kyrgyzstan and Tajikistan and it added that the situation is no better in Uzbekistan where it said the price of bread increased 15 per cent last year.

Food security is high on the political agenda and the media have commented on how this is increasingly being addressed at high-level political forums. The Pakistani news agency APP reported that the country's new cabinet had decided that an hour of every federal government meeting would be devoted to discussions on stabilizing prices, "especially food items".

In Taiwan, the China Post website reported that President Ma Ying-jeou had told a weekly cabinet meeting that the food price issue was a "national security issue". According to the newspaper, the president proposed a reduction in the reliance on imported food to enhance the country's food security; he called for import duties to be reduced and ordered a crackdown on hoarding food. It added that a national meeting is expected to be held to monitor food prices nationwide.

The Chinese Communist Party newspaper Renmin Ribao website reported that the government has decided to keep commodities like meat, sugar and vegetables in storage and to release them into the market at appropriate times. The Chinese authorities have also said that a drought across the north of the country is threatening the wheat harvest and will push up food prices.

The South Korean news agency Yonhap said the government had been asked to diversify its import sources of grains, increase stockpiles of grains and support agricultural investments in foreign countries. South Korea is particularly vulnerable to price volatility in international markets as it depends heavily on imports of grains for domestic supplies and the agency reported a government source as saying that the country intends to increase contract farming of vegetables and stocks. South Korea is one of dozens of countries that have bought or leased vast tracts of farmland in Africa and elsewhere for agricultural produce for its own population.

Severe weather conditions such as drought and floods in several major agricultural areas have limited farmers' ability to supply the global market adequately. The Oman Tribune said the outlook for good harvests continued to look bleak with rains and storms in Australia and snowstorms in the US, two important grain exporting countries. Poor weather conditions in countries like south India, Malaysia, the Philippines and Sri Lanka also raise fears of further pressures on escalating food prices and psychological apprehensions of shortages automatically lead to hoarding at every level of the supply chain, the paper said.

Sharing agricultural knowledge in Africa 'vital for food security'

African countries have been told that they need to do more to share agricultural knowledge and information – including the wider dissemina-

tion of research results – if they are to drive the continent's economic growth. The recommendation is included in a four-year strategic plan, launched by the African Forum for Agricultural Advisory Services (AFAAS) at its General Assembly held 12-14 April in Accra, Ghana.

According to the AFAAS, advisory services are critical to boosting food security. It wants to see "agricultural advisory services that effectively and efficiently contribute to sustained productivity and profitable growth of African agriculture". This is in line with the aims of the Comprehensive African Agricultural Development Programme (CAADP) – a brainchild of the New Partnership for Africa's Development – which seeks to raise agricultural productivity by at least six per cent by 2015.

The goal of the 2011–14 plan is to bring national agricultural advisors – from policymakers and government agencies to non-governmental organisations and extension workers – under a single umbrella to share information. The plan advocates wider dissemination of research outputs, for example through documenting and sharing innovations; increasing the uptake of improved technologies and making a practical commitment to research over the next four years. It also includes training for providers of agricultural advisory services.

The AFAAS said a lack of synergy between farmers, researchers and policymakers has meant African farmers have been slow to adopt innovations and research findings. Speakers cited poor information exchange, a lack of sharing best practices at the continental level, and low levels of networking and partnerships, as some of the causes.

In the past, advisory services have equated agriculture solely with production, but the interest of farmers is not just in production, but in making money and surviving. The constraints that farmers face in getting value from their production lies outside the farm – and the strategy is addressing this through an improved two-way dialogue with farmers. It is hoped that the strategic plan would help African countries to set up advisory services across the continent.

(Source: Scidev.Net)

African farmers need more relevant climate predictions

Seasonal climate predictions have been limited in their ability to meet the needs of rural farmers in Sub-Saharan Africa, according to a study. Uncertain rainfall and climate affect 70 per cent of Sub-Saharan Africa's population, hampering efforts to promote agricultural production, improve food security and reduce poverty, according to a paper just published in Experimental Agriculture.

Farmers could use seasonal weather predictions in many ways to boost food production. Research has shown that demand for climate information is widespread among farmers. A study in Burkina Faso found that 91 per cent of farmers participating in a pilot project applied seasonal forecasts to their decision-making. Seasonal climate information can be a powerful tool for farmers, but there is a "significant gap" between the information available and what farmers need.

Interaction between researchers and farmers can reduce communication barriers and improve the use of seasonal weather forecasts, studies show. Workshop participation in Zimbabwe increased crop yields by 19 per cent, for example. Poor access to relevant climate information for farmers results from a number of factors, such as the agricultural sector lacking ownership and a voice in climate services. A lot of co-learning can happen if farmers and meteorologists can work out the meaning and management implications of seasonal forecasting. However, seasonal forecasts do not have enough information to help farmers, according to Peter Webster of Georgia Institute of Technology, Atlanta, who emphasised the need to respond to farmers' requirements.

The authors of the study recommend five changes to enhance the use and benefits of seasonal forecasting. These included integrating seasonal forecasting into agricultural research and development strategies, developing the capacity to use and demand climate information, and giving the agricultural sector and farmers an effective voice regarding climate information products and services.

(Source: Scidev.Net)

Adapting agricultural water to climate change

A policy brief, published by the Overseas Development Institute (ODI), examines the relationship between climate change, water and food security and outlines potential adaptation strategies and policy priorities for developing countries.

Agriculture in developing countries is already under pressure from growing populations, industrialisation and environmental degradation. Climate change is expected to exacerbate and add to these problems. For example, estimates predict that for each degree Celsius rise in average temperature, dryland farm profits in Africa will drop by nearly ten per cent. Changes in rainfall variability and increased evaporation will directly impact rainfed agriculture and reduce water availability for irrigation and hydropower.

Strategies to reduce rural poverty in the face of climate change will largely depend on improving water management in agriculture. The author, ODI research fellow Eva Ludi, stressed that the first step must be to increase our understanding of water use and rural livelihoods in poor countries.

A number of strategies are outlined that could then be implemented to adapt agricultural production and water to climate change. These include switching to more drought-tolerant crops or livestock breeds, modifying irrigation techniques, adopting practices such as zero-tillage to conserve soil moisture, changing crop calendars or grazing times, and implementing seasonal climate forecasting.

Attention to policy is also needed in several key areas. First, developing countries must develop long-term water policies structured around country-specific legal, institutional, economic, social, physical and environmental conditions. These must integrate the different sectors that depend on water – from agriculture, livestock and fisheries to manufacturing, industry and municipal water use. Secondly, institutional and governance reforms will be needed to balance demand and supply across these sectors. Thirdly, enhanced stakeholder participation will be necessary to secure uptake of adaptation strategies. Finally, policy-makers will also need to develop their skills and those of end-users to understand the new challenges posed by climate change, and promote efficient irrigation and drainage systems to increase water productivity, while also making better use of groundwater storage to enhance water availability.

(Source: Scidev.Net)

Bookstack

Fifty Years of International Development: the work of HTS 1953-2003

Edited by Peter Thompson, Brian Kerr and Austin Hutcheon

Published by Austin Hutcheon, New Zealand. 2011, 141pp, paperback, £23.50

This book provides an esoteric view of international development over the second half of the 20th century, as seen through the history of one of the UK's principal consultancy firms: "Huntings". It complements the recently published history of the Land Resources Division, which charted the overseas survey and evaluation work of this government agency, and Thin on the Ground by Tony Young, which examined the work of UK-based professionals in land resource surveys since 1920. Both these histories had a primary focus on government programmes and land resource surveys.

By contrast, HTS has always been a company: the business approach has provided the discipline to ensure timely project completion and quality of product, whilst at the same time making a profit. So the present book gives a valuable insight into the private enterprise experiences of international development.

The editors effectively trace the progress of Hunting Technical Services (HTS) from its founding as a resource survey company in 1953, through its evolution into a globally renowned development and programme management consultancy. The text carefully interweaves company development and organisation with examples of diverse projects that track the progressive change in scope of work over the years, from resource surveys, through integrated rural development, poverty alleviation and livelihoods, capacity-building and governance. For those of us brought up in the consultancy world, we will find the current portfolio quite daunting: topics like environment, climate change, public sector reform, trade policy and 'counter proliferation'. The latter seems to be something to do with development of failed states to reduce terrorist risks?

People are central to the story but the editors were inevitably unable to quote everyone who was involved in the growth of HTS. A selection of 'boxed' anecdotes provides some human insights into the development world but it is unfortunate that more people did not respond to requests for contributions. This would have enabled a more personal glimpse of the dedicated and sometimes eccentric characters who were the driving force of the company. In the early days living conditions were often harsh and communications very slow but this engendered teamwork among HTS personnel.

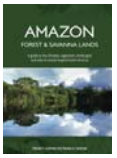
One trend that appears to have been missed by the editors is the shift from permanent to freelance staff. This can be traced to the rise of the EU aid programme in the 1980s, driving down consultancy rates and promoting ad hoc firms in other EC countries. By the 1990s, recipient countries themselves were fielding their own, often very competent, consultants. The squeezed margins and local competition saw the rise of UK freelance consultants but also the inability of firms like HTS to train and retain young professionals on their permanent staff. Does this sound familiar to TAA members?

So, at £23.50 per copy, is this worth buying? For anyone who has spent part of their life in overseas development consultancy, the answer is probably yes. If part of that time was served with HTS, as it was for me, the answer is definitely yes.

For copies, please contact: Peter Thompson, Bramley Cottage, Lower Dunsforth, York YO26 9RZ. Email pgvmt@bramley.prestel.co.uk Tel: 01423 322736

Keith Virgo

Amazon Forest and Savanna Lands: A guide to the climates, vegetation, landscapes and soils of central Tropical South America



Thomas T. Cochrane and Thomas A. Cochrane

CreateSpace, 2010, 190pp, paperback, ISBN: 978 1 45286 637 6. £36.32 (from Amazon)

This book provides an overview of the land resources of the Amazon in terms of the complex of climates, landscapes, vegetation and soils found throughout this vast, often misunderstood region. It has been prepared for a broad audience of soil scientists, agronomists, foresters, farmers, ecologists and also administrators. The text of the study is subdivided into 3 main sections which are supported by "References to studies" available from the authors´ web site: http://www.agteca.org

Section 1 is an updated sequel to the pioneering digital Land Systems study of the region carried by the senior author between 1976 and 1980, and published by CIAT-EMBRAPA-CPAC in 1985 (ISBN 84-89206-39-2). The authors have re-digitized that study as a Personal Computer Version with Database available free from their Web site.

Section 2 summarizes three larger-scale Land Resource Studies of critical areas of Amazonia, "The Geo-economic Region of Brasilia", "The Northern Amazon Region of Bolivia", and "The Western Amazon State of Rondonia, Brazil". The section starts with a discussion on the methodology developed for those studies and how the computerized Land Systems approach was subsequently refined and adopted by the ISSS in developing the SOTER methodology.

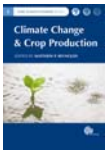
Section 3 summarizes a series of findings from the land resource studies in the Amazon, including discussions of climate, deforestation, the "Paradox of Savannas in Amazonia" and "Leaching losses and the improvement of Amazon Forest and Savanna soils".

The main text is complemented with an extensive Appendix which, amongst other subjects summarizes the authors' statistical

study of the chemical properties of native savanna and forest soils in central Brazil, some novel analytical procedures, and other technologies including summaries of the authors´ equations to a) Correct Al toxicity in tropical mineral soils; b) To estimate fertilizer needs in lesser developed tropical regions, and c) The authors´ new equation for calculating osmotic potential. This latter equation has led to the development of a unifying theory of "Solution flow through the soil-plant continuum" which should be of interest to all soil and plant scientists.

The book, apart from providing a fresh and novel insight into the ecological complex of forest and savanna lands throughout Amazonia, summarizes a gamma of technologies of importance to the study of tropical lands in general. It is considered that it would be a valuable reference source for many soil, plant, and ecological scientists. The book is available from www.amazon.com, https://www.createspace.com/3453794 or through a link from the authors' website: www.agteca.org/amazon.htm

Climate Change and Crop Production



Edited by M P Reynolds

CAB International, 2010, 320 pp, Hardcover. ISBN 978 1 84593 633 4, £85

Current trends in population growth suggest that global food production is unlikely to satisfy future demand under predicted climate change scenarios unless rates of crop improvement are accelerated. In order to maintain food security in the face of these challenges, a holistic approach that includes stress-tolerant germplasm, sustainable crop and natural resource management, and sound policy interventions will be needed.

The first volume in the CABI Climate Change Series, this book will provide an overview of the essential disciplines required for sustainable crop production in unpredictable environments. Chapters include discussions of adapting to biotic and abiotic stresses, sustainable and resource-conserving technologies and new tools for enhancing crop adaptation. Examples of successful applications as well as future prospects of how each discipline can be expected to evolve over the next 30 years are also presented. Laying out the basic concepts needed to adapt to and mitigate changes in crop environments, this will be an essential resource for researchers and students in crop and environmental science as well as policy makers.

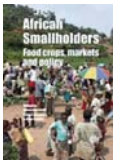
Irrigation Management

M Burton

CAB International, 2010, 392pp, Hardcover. ISBN: 978 1 84593 516 0, £85

In many countries irrigated agriculture consumes a large proportion of the available water resources, often over 70% of the total. There is considerable pressure to release water for other uses, and as a sector irrigated agriculture will have to increase its efficiency and productivity of water use. Drawing on the author's 30 years of experience in some 28 countries, this book offers knowledge for the management of irrigation and drainage systems, including traditional technical areas of systems operation and maintenance, and expanding managerial, institutional and organizational aspects. Chapters provide guidelines to improve management, operation and maintenance processes, which move management thinking out of traditional public-sector mindsets to a more customer-focussed, performance-oriented service delivery. As a practical guide to improve efficiency and productivity in irrigated agriculture, this book will be essential reading for irrigation managers and technicians as well as students and policymakers.

African SmallholdersFood Crops, Markets and Policy



Edited by G Djurfeldt (University of Lund, Sweden), E Aryeetey (University of Ghana), and A Isinika (Sokoine University of Agriculture, Tanzania). CAB International, 2010, 400pp, Hardcover. ISBN: 978 1 84593 716 4, £85

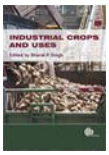
Poverty in sub-Saharan Africa is predominantly a rural and agricultural phenomenon. The large majority of all poor are farmers and herders, therefore as long as the poor remain smallholders, alleviation of poverty remains an agricultural task. African Smallholders documents the farm-level effects of agricultural policies, focusing on a variety of themes including micro-credit, infrastructure, cash crop production and food security. To deepen our understanding of agricultural development it discusses staple food production in sub-Saharan Africa and its response to changing geo-political, macro-economic and agricultural policy. It is a useful resource for all those researching or involved with food security, agricultural and rural development in sub-Saharan Africa.

Bananas and Plantains

J. C. Robinson (Banana Consultant, South Africa) and V. Galán Saúco (Instituto Canario de Investigaciones Agrarias, Tenerife). CAB International, 2010, 320pp, Paperback. ISBN: 978 1 84593 658 7, £37.50

Bananas and plantains are major fruit crops in the tropics and subtropics, making a vital contribution to the economies of many countries. In the last 15 years, substantial changes have occurred in banana production, among them the increased importance of fungal and viral diseases and their serious impact on Cavendish export cultivars, smallholder plantains and cooking bananas. Changes in production systems such as protected greenhouse cultivation, organic, fair-trade and integrated cultivation and their respective certification schemes have also become prominent. This book provides an accessible review of the scientific principles of banana production and how these relate to field practices. Revised and updated with expanded coverage of world trade statistics and policies, breeding of new cultivars in relation to disease resistance and markets, prospects for genetically-modified bananas and the increasing role of endophytes in controlling pests and diseases, this new edition is an essential resource for researchers and students in horticulture.

Industrial Crops and Uses



Edited by Bharat P. Singh (Professor of Agronomy, Fort Valley State University, USA)

CAB International, 2010, 528pp, Hardcover. ISBN: 978 1 84593 616 7, £115

The demand for plant-based industrial raw materials has increased as well as research into expanding the utility of plants for current and future uses. Plants are renewable, have limited or positive environmental impact and have the potential to yield a wide range of products in contrast to petroleum-based materials. Plants can be used in a variety of different industries and products including bioenergy, industrial oil and starch, fibre and dye, rubber and related compounds, insecticide and land rehabilitation. This title offers a comprehensive coverage of each of these uses. Chapters discuss the identification of plant species with desired traits, their cultivation to obtain the needed raw materials, methods utilized in producing different finished products, current and future research in crop production and processing and the present state and future prospects for the industry. Providing the first systematic review of industrial crops and their uses, this book will be an important resource for students and researchers of crop science and agricultural policy makers.

Treated Wastewater in Agriculture: Use and impacts on the soil environments and crops

Guy Levy, P. Fine and A. Bart-Tal

Wiley-Blackwell, 2010, 464pp, Hardcover. ISBN: 978-1-4051-4862-7, £125

As the world's population increases and the demand for water increases apace there is a rising demand for information concerning the reuse of wastewater, particularly for the irrigation of key food crops worldwide. This important new book addresses in detail the use of treated wastewater in agricultural situations, its impact on crops and the soil environment. Coverage includes the composition and treatment of wastewater, health considerations, regulations and economic aspects. Major sections of the book also concentrate on crop management and the soil environment. This book is an essential purchase for all those working in irrigation, water management and crop production worldwide.

Use of Treated Wastewater (TWW) for irrigation is increasingly important as the world's population increases.

Chapters prepared by leading scientists in the field.

Comprehensive coverage of current knowledge and advances in the area of TWW.

Focus on possible environmental impacts (positive and negative)

Mailbox

CABI

I enjoyed reading Jim Waller's history of the Imperial Agricultural Bureaux and their successor, CABI. However I am disappointed that the Imperial Bureau of Soil Science was not included, with a reference to its long-time director from 1931, Graham V. Jacks (1901-1977). In addition to the succinct and informative abstracts in *Soils and Fertilizers* his editorials were perceptive. One especially I remember entitled "The Summary" (*Soils and Fertilizers* 24, 1961, 409-410). He summarized his advice with a poem:

Take out every surplus letter – boil it down.
Fewer syllables the better – boil it down.
Make your meaning plain. Express it
So we'll know, not merely guess it;
Then, my friend, ere you address it, BOIL IT DOWN.

Very good advice applicable to scientific papers as well as their summaries.

Jim's mention of Tom Goodey pleased me, reminding me of the interesting and enjoyable time when I lodged with him and his wife, Constance; and the occasional evening song recitals he gave in their sitting room.

Peter H. Le Mare
Allithwaite, Grange-over-Sands, Cumbria

Tropical Agriculture Association
Registered Charity No. 800663

University of Reading

THE SIXTH HUGH BUNTING MEMORIAL LECTURE

Presented by

Amir Kassam OBE, FSB
Visiting Professor, School of Agriculture, Policy and Development, University of Reading;
Convener, Land Husbandry Group of the Tropical Agriculture Association (TAA);
former Deputy Director General at WARDA (the Africa Rice Centre) and Interim Executive Secretary, CGIAR Science Council

Future of Farming:
What Needs to Change?

Date: Monday, 13th June 2011

Venue: John Madejski LectureTheatre
Agriculture Building, Earley Gate
University of Reading

Programme: *Chair – Dr Andrew Bennett CMG, President, TAA*

- 18:00 - 18:30 – Assemble
- 18:30 - 18:40 – Welcome – *Dr Michael Gooding, Head of School*
- 18:40 - 20:00 -- The Hugh Bunting Memorial Lecture – *Dr Amir Kassam*
- 20:00 - 21:30 – Reception and finger buffet -- *free*

Spouses and partners are very welcome.

RSVP to: **Mrs Linda McCarthy (l.mccarthy@reading.ac.uk; tel: 0118 378 4549).**

How to get there? Consult the University of Reading map website – www.rdg.ac.uk/maps/
The Agriculture Building, opened in 2000, is Building Number 59 (Square D8) on the Whiteknights campus map. Please use the Earley Gate entrance to the campus.

Hugh Bunting made many contributions during his career to the understanding and practice of tropical agriculture. He inspired and challenged many generations of his students, many of whom went on to fill influential positions around the world. Hugh was Professor of Agricultural Botany at the University of Reading from 1956 to 1982. For seven years he was Dean of the Faculty of Agriculture and Food. He contributed substantially to enhancing the University's reputation in agricultural science and technology and in developing the University's competence and reputation in tropical agriculture.

Hugh would happily take development agencies to task if he felt that they were guilty of woolly thinking or actions not firmly based on evidence. He held the first and only Chair of Agricultural Development Overseas at Reading, funded by the British Aid Programme – ODA and ODM. He was Chair of the working group set up by Bob Cunningham and ODA to decide on the future of the ICTA Association, which resulted in the establishment of the TAA. Working with David Betts he was largely responsible for the drafting of the first constitution and for the registration of the TAA as a UK charity.

Hugh always encouraged us to learn the lessons of the past but to look forward, so the overall theme of the memorial lectures is 'agricultural futures'.

Upcoming events

South-West

Thursday 12 May

Seminar on "Agriculture in the Gambia" at Bicton College, East Budleigh, Budleigh Salterton, Devon.

Seminar cost will be £10. Participants can purchase their lunch in the college canteen.

Registrations in advance with David Wendover on david_wendover@hotmail.com
or George Taylor-Hunt on gltaylorhunt@talktalk.net

East Anglia

July

Proposed visit to Frederik Hiam Ltd, a major vegetable production and processing enterprise near Mildenhall, Suffolk. More details and the date will be circulated in due course. Contact Keith Virgo keith.virgo@btinternet.com

Land Husbandry Group

Saturday 4 June

Farm Walk with Tony Reynolds - No Till Farming (also known as Conservation Agriculture). Thurlby Grange Farms, Thurlby, Bourne, Lincolnshire PE10 0EA

Visit to Tony Reynolds Farm to see at firsthand his no-till farming system that since 2006 has meant no mechanical movement of soil to grow crops, with organic mulch cover and crop rotation.

Programme

12:00	Meet at Thurlby Grange
12:30	Buffet lunch
13:15	Presentation by Tony Reynolds
13:45	Farm tour
15:15	Back for tea and questions
16:15	Departure

Location: Thurlby Grange Farm is 2 km south of Bourne on the A15. The farm drive is directly to the East side of the A15. The nearest train station is Peterborough.

There will be room for up to 30 visitors.

For further information on this visit or those wishing to participate please contact Amir Kassam or Francis Shaxson at: landhusbandry@taa.org.uk
Amir Kassam: Mobile: 07768011313;
Francis Shaxson: Tel: 01929471193
Tony Reynolds: Tel: 01778422143;
Mobile: 07740824028

Other Events

27-28 April: Vegetation Management Sheffield Hallam University, Sheffield (Association of Applied Biologists) Details at aab.org.uk

12-13 May: Workshop: Can incentives for soil carbon contribute to food security and biodiversity conservation?

UNEP-WCMC, Cambridge (UNEP-WCMC and the Departments of Plant Sciences and Land Economy, University of Cambridge supported by the CCI Strategic Initiative Fund (Cambridge Conservation Initiative).

Incentive measures that encourage maintenance and sequestration of soil carbon are less developed than those for forest carbon, with outstanding questions on methodology, baseline values, long-term biodiversity benefits, and regulatory frameworks. As the global soil carbon pool reportedly holds double the carbon held in either vegetation or the atmosphere, it will be important to gain a clearer understanding of the potential role of land managers in managing biodiversity and soil carbon in production landscapes.

The workshop will bring together experts to review the opportunities and challenges for safeguarding biodiversity and food supply arising from payments for soil carbon. Workshop participants will develop a policy brief that raises awareness amongst decision makers and highlights priority areas for further collaborative research.

Contact: Alison.Rosser@unep-wcmc.org

28-29 June: GM Crops: From Basic Research to Application Rothamsted Research, Harpenden (Association of Applied Biologists) Details at aab.org.uk

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